

10. The abbreviations follow exactly the order of the full titles.
Proc. California Acad. Sci., *not* California Acad. Sci. Proc.
U.S. Nat. Mus. Bull., *not* Bull. U.S. Nat. Mus.
Trans. Acad. Sci. St. Louis, *not* Trans. St. Louis Acad. Sci.
 - 11.. If the title is given on the journal in several languages, use
the one in the native tongue unless it is in non-Latin
characters.
Sbornik Ent. odd. Nat. Mus. Praze, *not* Act Ent. Mus. Nat.
Pragae, *not* Per. Ent. Sect. Nat. Mus. Prague.
Hor. Soc. Ent. Rossicae, *not* the Russian form.
 12. Do not translate titles into English (or any language other
than the original.)
-

Bibliographia

BOOK REVIEWS

INSECTS OF HAWAII, by Elwood C. Zimmerman. Vol. 1, Introduction, 206 pp., 52 figs., University of Hawaii Press, Honolulu. 1948. \$3.50.

This is the introduction to a manual of the insects of the Hawaiian Islands; only parts of particular interest to students of beetles are mentioned here. According to the author, who is a well known coleopterist at the Bernice P. Bishop Museum in Honolulu, the Hawaiian Islands arose from the sea bottom as a result of volcanic activity in the late Tertiary, about 5,000,000 years ago. They were populated largely by wind-blown organisms from the nearest neighboring lands. There is no reason to believe that continental land masses were any nearer then than now, but it is possible that there were neighboring "high" islands that have since been eroded down and become coral reefs and from which elements of the fauna could have been derived.

The 1600 species of beetles in the archipelago constitute nearly one-third of the insect fauna. Of these, 1,220 species and 70 varieties are endemic, i.e., not naturally found elsewhere. The endemic forms belong to 19 families, of which the Carabidae (222), Aglycyderidae (181), Curculionidae (159), Anobiidae (156), Nitidulidae (143),

Cerambycidae (100), and Staphylinidae (93) are best developed, with Ciidae (50), Elateridae (45), Histeridae (35), Eucnemidae (33), Scolytidae (23), and Dermestidae (20) coming next. It is possible to derive these 1220 species from only about 40 (39 to 41) original immigrants. (The entire 3722 endemic insect species can be derived from between 223 and 254 immigrants, the 1064 endemic land snails from between 22 and 24 immigrants, the 70 endemic birds from 15 immigrants, and the 1633 endemic seed plants from 272 immigrants.) The most extensive speciation has occurred in the Aglycyderidae including the single wingless genus *Proterhinus*, all of whose 164 species are probably derived from a single immigrant. The 222 Carabidae have probably come from between 4 and 6 immigrants, the 156 Anobiidae from 3, the 143 Nitidulidae from 2, and the 100 Cerambycidae from 3 immigrant species. Host plant specificity, the isolating effect of the incredibly rugged terrain, and the effects of mutation in small populations have been important elements in this speciation. The species frequently have a very restricted distribution. Thus 13 species of *Rhyncogonus* (Curculionidae) have a non-overlapping distribution on the single island of Oahu.

Many groups of species are flightless, e.g., the Aglycyderidae (164 species) and *Mecyclothorax* (85 species, Carabidae). Darwin attributed this to the selective influence of winged individuals being blown out to sea! Dr. Zimmerman believes that the Hawaiian Islands are too large to make such a process effective. He proposes as an alternative, that the insular environment is so simple and offers so little opposition to colonization that degenerate wingless mutants that would normally be eliminated by natural selection are allowed to survive. Large sections of Coleoptera, including Carabidae, Staphylinidae, Histeridae, Nitidulidae, Elateridae—over 500 species—are not known to have any insect parasites and no important predators in the adult stage. The wood-boring beetles (Anobiidae, Ciidae, Cerambycidae, Curculionidae) are more subject to endemic parasite and/or predator attack.

The Polynesians arrived in the islands about the twelfth century, bringing with them chickens, pigs, dogs, and rats. Following the visitation of Captain Cook in 1778, cattle, goats, sheep, horses, cats, agriculture, and a host of associated plants and animals were introduced. Cattle, by destroying the undergrowth and promoting the spread of introduced grasses, have been particularly destructive to the forests. At an early date the islands of Kahoolawe and Niihau were completely

denuded by cattle, sheep, and goats, resulting in the extermination of the endemic flora and fauna; and on the larger islands the native forest has been reduced to less than one-fourth of its original extent. Below 1500 to 2000 feet few endemic insects remain. The voracious introduced ant, *Pheidole megacephala*, which occurs everywhere in the lowlands, alone has accounted for untold slaughter. Introduced parasitic wasps, likewise, have attacked certain of the endemic species; and in 1913, 90% or more of two species of endemic Cerambycidae were found to be parasitized by foreign *Ischiogonus* wasps. In all, Dr. Zimmerman estimates that a third or more of the endemic insect species of the islands have become extinct, and most of the survivors have been greatly reduced in numbers.

Man has discovered, however, that, if he is to continue to inhabit the archipelago, he must protect the watersheds. About one-fourth of the total area is now forest reserve, but not all the forest reserve is clothed in native forest.

MELVILLE H. HATCH.

A CENTURY OF ENTOMOLOGY IN THE PACIFIC NORTHWEST, by Melville H. Hatch. University of Washington Press, Seattle. March 14, 1949. \$1.50.

This is an interesting little booklet of 43 pages with portraits of ten entomologists. It recalls the development of interest in insects in the Pacific Northwest region and the persons who took part. It briefly mentions the early collectors and the specialists who received their specimens, the colleges where entomology has been taught, the agencies concerned with insect control and eradication, the principle collections and their custodians, and the publications of the local entomologists.

It will be of interest to all those concerned with the insects of the region, as well as to biographers of entomologists and historians of entomology.

Professor Hatch divides the history of entomology in the Pacific Northwest into three periods, that of itinerant collectors from 1834 to 1875, that of resident collectors from 1875 to 1890, and that of established laboratories from 1890 to the present. Three periods of somewhat different extent can also be seen in Professor Hatch's history, resulting from a different line of approach; these are a period of collecting from 1834 to 1890, with the specimens studied largely by eastern or European scientists; a period of development of economic